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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/930,430      | 08/14/2001  | Ramesh Raskar        | CR-1341             | 1539             |

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02/25/2004

Patent Department  
Mitsubishi Electric Research Laboratories, Inc.  
201 Broadway  
Cambridge, MA 02139

EXAMINER

WHELPLEY, MICHAEL V

ART UNIT

PAPER NUMBER

2671

DATE MAILED: 02/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/930,430

Applicant(s)

RASKAR ET AL.

Examiner

Michael V Whelpley

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE \_\_\_\_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 14 August 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 August 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stegmann, et al. (US Patent 6,415,050) and Sukthankar, et al. (US Patent 6,618,076). Stegmann describes a method for displaying designs on a three-dimensional object. Sukthankar describes a method and apparatus for calibrating a projector-camera system.

3. With regard to Claim 1, Stegmann describes a method for displaying an object design, in which an internal 3D graphic model of a physical, real world object is obtained (Col 5 Lines 23-24), and an image of the model is projected onto the physical object from a fixed location (Col 5 Lines 45-53). An embodiment of the method employs calibrations points on the physical object, which are checked against the projected image for display accuracy (Col 11 Lines 11-34).

4. Stegmann does not specifically disclose determining a transformation between the calibration pixels of the projected image and the calibration points on the physical object in order to register the model with the physical object. Sukthankar describes a method of calibrating a projector system in which a calibration pattern, containing a plurality of feature points, is projected onto a projection surface. The locations of the feature points on the surface are detected, and parameters are obtained for mapping, or

transforming, the image so that it is correctly displayed on the surface (Col 2 Lines 33-51). It would have been obvious to those of ordinary skill in the art at the time the invention was made to include the transformation according to projected calibration points to the calibration detection system of Stegmann, because once an error is detected in a display, it is desirable to alter the display data so that a corrected image may be displayed.

5. With regard to Claim 2, Sukthankar does not specifically describe using the determined mapping parameters to transform, render, and display an image on the projection surface. It would have been obvious to those of ordinary skill in the art at the time the invention was made to include the steps of transforming, rendering, and displaying an image using the determined mapping parameters as described by Sukthankar, because once the errors in the projected image are corrected by the transformation, it is desirable to display the corrected image rather than the erroneous one.

6. With regard to Claim 3, Stegmann does not specifically disclose using six or more calibration points. It would have been obvious to those of ordinary skill in the art at the time the invention was made to use at least six calibration points in the image display method of Stegmann, because a three dimensional object must have at least six reference points in order to effectively determine the accuracy of an image superimposed on it.

7. With regard to Claim 4, Sukthankar discloses utilizing the techniques of linear algebra, which include transformation matrices, for obtaining the mapping parameters

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(Col 4 Lines 28-48). Sukthankar does not specifically disclose using a projector transformation matrix and a viewer transformation matrix. It would have been obvious to those of ordinary skill in the art at the time the invention was made to use a projector transformation matrix and a viewer transformation matrix to obtain the mapping parameters in the method of Sukthankar, because it is necessary to transform the image in the projector space and the viewer space in order to obtain an accurate projection.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stegmann and Sukthankar as applied to claim 1 above, and further in view of Penkethman (US Patent 6,549,649). Penkethman describes an apparatus and method for projecting an alignment image, in which two imaging systems are calibrated by generating an alignment image, which may include a cross-hair pattern, at the focal point of one system (Col 5 Line 49 - Col 6 Line 2). It would have been obvious to those of ordinary skill in the art at the time the invention was made to include a cross-hair for calibration in the method described by Stegmann, because a user can visually detect the alignment of a cross-hair more easily than the alignment of individual calibration points.

9. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stegmann and Sukthankar as applied to claim 1 above, and further in view of Mizushima, et al. (US Patent 5,988,817). Mizushima describes a projection system employing a plurality of projectors.

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10. With regard to Claim 6, Stegmann discloses that different projection methods can be used according to the surface to be illuminated (Col 5 Line 46 – Col 6 Line 5), but does not specifically disclose illuminating the real-world object with a plurality of images from a plurality of projectors at fixed locations. Mizushima discloses using a plurality of projectors at fixed locations to project adjacent images onto a screen (Col 5 Lines 10-37). It would have been obvious to those of ordinary skill in the art at the time the invention was made to include the use of multiple projectors at multiple locations to illuminate separate areas of an object in the method of Stegmann, because illuminating the object from a plurality of locations allows it to be viewed from multiple angles.

11. With regard to Claim 7, the rationale for Claim 2 is incorporated.

### ***Conclusion***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael V Whelpley whose telephone number is (703) 305-5584. The examiner can normally be reached on 8:30-5, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman can be reached on (703) 305-3900. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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